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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,792	10/18/2005	Masayuki Shirai	279820US0PCT	6097
22850	7590	11/02/2006		
C. IRVIN MCCLELLAND OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER WITHERSPOON, SIKARL A	
			ART UNIT 1621	PAPER NUMBER

DATE MAILED: 11/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/553,792

Applicant(s)

SHIRAI ET AL.

Examiner

Sikari A. Witherspoon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

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|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/17/06</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weinstein (US 5,107,038) and Rylander et al (US 3,177,258), and further in view of Jansen et al (US 6,002,047).

The instant claims are drawn to a method of hydrogenating a phenol by reacting a phenol and hydrogen in the presence of a supported rhodium and/or ruthenium catalyst, also in the presence of carbon dioxide. The phenol reactant may be phenol, cresol, naphthol and their substituted derivatives.

Weinstein teaches a process for preparing an alkyl substituted cyclohexanol by hydrogenation of the corresponding phenol or cyclohexanone in the presence of a catalytic system composed of rhodium on a silica, alumina, titania, or charcoal support (abstract). The hydrogenation is conducted at temperatures from 25 to 200° C and pressures from  $3 \times 10^5$  to  $2 \times 10^6$  Pa (col. 3, lines 1 to 53).

Weinstein only teaches 4-tert-butyl-phenol as the phenol reactant in his process; however, Rylander et al teach a hydrogenation reaction wherein ruthenium-containing catalysts supported on carbon, alumina, silica, titania, and the like, and also containing another platinum group metal, are used to hydrogenated phenols including the cresols,

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naphthols, and anthrols, under similar conditions of temperature and pressure (col. 3, lines 9-36).

In light of Weinstein and Rylander et al, it would have been obvious to a person of ordinary skill in the art that hydrogenation reactions using a catalyst comprising supported rhodium and/or ruthenium could be employed with various phenolic compounds as reactant, with the reasonable expectation of successfully producing the corresponding hydrogenated product.

The difference between the instant claims and the process brought out by the combined teaching of Weinstein and Rylander et al is that neither of the former references teaches conducting the hydrogenation in the presence of carbon dioxide, as claimed herein. Jansen et al, however, teach that catalytic hydrogenation reactions are beneficially operated using a solvent under near-critical or super-critical conditions. Such a solvent is super-critical carbon dioxide (col. 4, lines 3-15).

It therefore would have been obvious to a person having ordinary skill in the art, at the time the present invention was made, to conduct hydrogenation reactions such as those taught by Weinstein and Rylander et al, in the presence of supercritical carbon dioxide, since, as taught by Jansen et al supercritical carbon dioxide has outstanding properties in hydrogenation reactions, including good dissolving capacity for not only hydrogen, but many organic compounds, and ease of separation from the product.

### ***Claim Objections***

Claims 4-11, 13 and 14 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to another claim in the alternative only, and should not depend from another multiple dependent claims. See MPEP § 608.01(n).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikarl A. Witherspoon whose telephone number is 571-272-0649. The examiner can normally be reached on M-F 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thurman Page can be reached on 571-272-0602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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*Karl A. Witherspoon*

**KARL A. WITHERSPOON**  
PRIMARY EXAMINER